**API Testing**

**What is API?**

* An API, stands for Application Programming Interface. It is a set of rules, protocols, and tools that allows different software applications to communicate and interact with each other.
* APIs defines the method and data formats that developers can use to request and exchange information between different software components.

**What is API Testing?**

* API Testing is a type of testing software testing that focuses on testing the application programming interface
* APIs define the interaction between different software components, allowing them to communicate with each other.
* API testing involves verifying that APIs meet their functional, performance, security, and reliability requirements.

**Types of API**

* **Web API**

1. Simple Object Access Protocol (SOAP)
2. Remote Procedure Call (RPC)
3. Representational State Transfer (REST)

**What is REST API in API Testing?**

* In Simple term Rest API is nothing but a design pattern for web API.
* The REST Architecture style describe six constraints.
* 1.Uniform interface

2.Stateless

3.Cacheable

4.Client-Server

5.Layered System

6.Code on Demand

* **Uniform Interface** – The uniform interface constraints defines the interface between clients and servers.
* **Stateless** – Each request from a client to the server must contain all the information necessary to understand and process the request
* **Cacheable** – Responses from the server can be explicitly marked as cacheable or non – cacheable using cache-control directives.
* **Client Server** – The client and server are separate entities that communicate through a uniform interface This separation of concern allows the client and server to evolve independently, improving scalability and flexibility.
* **Layered System** – It means that the between client and server there can be any number of layered systems it does not matter.
* **Code on Demand** – The server can store the code or logic to themselves and transfer it whenever needed rather client -side logic

**Who Uses REST?**

* Most of webapps, mobile are relying on REST API.

Twitter

LinkedIn

**Types of Testing in API?**

* **Functional Testing:** This type of Testing focuses on verifying that the API functions as expected according to its specifications. It involves testing different API endpoints, parameters, request methods and responses.
* **Integration Testing:** Integration testing evaluates how well the API interacts with other

Components or systems.it ensure that data is exchanged correctly between different software components

* **Regression Testing:** Regression Testing ensures that recent changes to the API. It involves retesting the API after modification to ensure that existing functionality still works as expected.
* **Security Testing:** Making sure the API is safe from hackers its like checking if the doors and windows of a house are locked properly.
* **Load Testing:** Load testing assesses the performance of the API under various load conditions It involves sending a large number of requests to the API simultaneously to measure its response time and scalability.
* **Penetration Testing:** Penetration testing is like hiring a friendly hacker to try to break into your computer network, website, or software. Their goal is to find and fix security weaknesses before real hackers can exploit them. It’s a way to make sure your digital stuff is safe.
* **Fuzz Testing:** Fuzz testing is also known as fuzzing is a software testing technique that involves sending invalid, unexpected or random data as input to a program or system in order to uncover bugs. The goal of fuzz testing is to find errors, security weakness that may not be detected by traditional testing methods.

**Difference between SOAP and REST API?**

| **SOAP** | **REST** |
| --- | --- |
| SOAP (Simple Object Access Protocol) relies on XML as its message format and typically uses HTTP or other protocol | REST is like sending a text message. Its simple and flexible uses format like JSON or XML for  messages |
| SOAP messages have a rigid structure defined by a formal specification. They include elements like ‘<Envelope>’, ‘Header’ | REST messages are simpler and more lightweight. They typically consist of JSON or XML payloads |
| It’s good for complex tasks and when you need strict rules for communication. | Its great for simple tasks and when you want more freedom in how you talk to your system. |
| Imagine filling out a form with lots of detailed instructions and sending it through certified mail | Imagine having a casual conversation where you can say what you want and however you want. |

**What to Test in API Testing?**

* In API testing, you typically want to verify various aspects to ensure the API functions correctly and meets the requirement of its user.
* Test that the API performs the expected operations accurately. Verify that API endpoints return the correct responses for different inputs and scenarios.
* Tests for invalid inputs, boundary conditions.
* Test how the API handles error and exceptions. Verify that it returns appropriate error codes and messages for invalid requests
* Assess the performance of the API under various loads and conditions. Test its response time.

**HTTP Methods**

* **1. GET Method:** GET is used to retrieve data from a specified resources. It send a request to the server asking for a particular resource and the server responds with the requested data. GET request should only retrieve data and should not have any other effect on the server.
* **2.HEAD** – For only Header Information
* **3.TRACE** – Return traces of the request.
* **4.PUT** - PUT is used to update or replace a resource at a specified URL. It sends a request to the server with the update data in the request body, which the server then uses to update the specified resource.
* **5.POST** – POST is used to submit data to be processed to a specified resource. POST request can create new resource, update existing ones or perform other actions on the server.
* **6.DELETE** – DELETE is used to remove a resource from a specified URL. IT sends a request to the server indicating that the resource at the specified URL should be deleted.
* **7.OPTIONS** -Return available HTTP and other options.

**API Testing Tools**

* SoapUI
* **Postman**
* Katalon Studio
* Rest Assured CI/CD